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REMARKS

Claim 16 is amended herein not to change the scope of the claim but rather to correct a typographical error to recite proper antecedent basis for the term said "endothermic reaction product" under the transferring step as well as to emphasize the attribute of the secondary stage water gas step membrane reactor and having a membrane through which the hydrogen in purified form flows leaving a hydrogen poor raffinate gas stream on the inlet side of the reactor membrane. Support for these amendments as such is submitted to be found within claim 16 as pending prior to these amendments and as such no new matter has been added by way of this amendment. Entry of this amendment and the reconsideration and allowance of the claims is requested on the basis of the following remarks.

Currently all the pending claims, claims 16-25, stand rejected under 35 U.S.C. §103(a) over Towler et al. (US 6,409,974) in view of Holland (US 6,572,837). Reconsideration and removal of this rejection is requested on the basis that the articulated rejection fails to meet both the structural and factual requirements for a *prima facie* case of obviousness as articulated by the Court in *KSR Int'l Co. v. Teleflex, Inc.*, 127 S. Ct. 1727 (2007) and as captured in the Examination Guidelines published in the Federal Register, Vol. 72, No. 195, 57526-57535.

The Supreme Court in *KSR Int'l Co. v. Teleflex, Inc.*, 127 S. Ct. 1727 (2007) has recently articulated the standard for establishing whether a claim is obvious over prior art. In *KSR* the Court reestablished that the analysis of *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), remains the controlling precedent. Under *Graham*, to establish a *prima facie* case of obviousness an Examiner must analyze:

- (1) the scope and content of the prior art;
- (2) the differences between the claimed invention and the prior art; and

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(3) the level of ordinary skill in the pertinent art.

Graham, 383 U.S. at 17–18, 148 USPQ at 467.

While the outstanding rejection appears to cursorily address the scope and content of the prior art and the differences between the claimed invention and the prior art, the level of ordinary skill in the art is not articulated either expressly or inherently. As such, the outstanding rejection fails to satisfy all elements required for a finding of obviousness as required under the analysis defined in *Graham* and reaffirmed in *KSR*. Applicant presents rebuttal arguments *infra* that address each of the *Graham* elements and the rationale for a conclusion of obviousness.

**The Scope and Content of the Prior Art and
Differences Between the Claimed Invention and the Prior Art**

The basis of the rejection is that Towler et al. teaches all the limitations of pending independent claim 16 with the exception that “Towler fails to teach that hydrogen is passed through a membrane to thereby separate the hydrogen from the raffinate stream after the water gas shift reaction.” (Paper No. 20080716, page 4, first paragraph). Holland et al. is cited to bolster the deficiencies of Towler et al.

Holland et al. is specifically cited for teaching:

a method for producing hydrogen (col. 1) wherein two reactions proceed, the first being a reforming reaction and the second being a water gas shift reaction, whereby the product stream of the water gas shift reaction is purified by passing the hydrogen through a hydrogen permeable membrane and leaving the raffinate (col. 4, lines 15-26; col. 7, lines 46-61).

Holland et al. at column 7, lines 10-38, teaches that gaseous products from the primary reactor 104 are fed to a secondary fuel processing reactor where retentate stream is converted to “a second reformat stream comprising hydrogen” (column 7, lines 18-20). The hydrogen produced in the secondary fuel processing reaction 110 is then pressurized by way of a compressor 112 or

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alternatively an ejector before introducing the second reformat stream under higher pressure into a hydrogen separation device 106 containing a hydrogen permeable membrane.

In contrast to Holland et al. that forms an unspecified hydrogen production reaction within the secondary fuel processing reactor 110 and then performs separation in a separate device 106 after pressurization of the gas entering the separator, the claimed invention as evidenced by the claim limitation of a "secondary stage water gas step membrane reactor" makes clear that the membrane through which purified hydrogen selectively passes to exact separation is integral within the gas water shift reaction reactor. In other words, the present invention does with a secondary stage water gas step membrane reactor what Holland et al. requires three separate components to do, as for example indicated in Fig. 1 of Holland et al. with respect to reference numerals 110, 112 and 106. As the prior art reference combination fails to afford membrane separation within the secondary stage water gas step membrane reactor, the prior art reference combination fails to yield the claimed invention or afford a teaching, suggestion or motivation commensurate in scope with the claims as will be further detailed below.

Resolution of One of Ordinary Skill in the Art

Part of the *Graham* factual inquiry requires an indication of the level of ordinary skill in the art to which the invention pertains. The outstanding Office Action embodied in Paper No. 20080716 fails to resolve either expressly or inherently the level of ordinary skill in the art. In the absence of a proper resolution of the level of ordinary skill in the art as the court has required in both *KSR* and *Graham*, a *prima facie* case of obviousness is not met. In the event that this rejection is maintained, it is respectfully requested that such an indication as to skill in the art be provided in which case, Applicant reserves the right to make of record declaratory statements as to the skills required to develop the claimed invention.

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Rationale for Obviousness

The Supreme Court and the Court of Appeals for the Federal Circuit are in agreement that the teaching, suggestion, and motivation test as used by the CAFC is fully consistent with an analysis of obviousness under *Graham*. The Court in *KSR* articulated that “[t]here is no necessary inconsistency between the idea underlying the TSM test and the *Graham* analysis,” and explained that the CAFC has, in many cases, applied the TSM test in accord with the principles of *Graham*. *KSR*, 127 S. Ct. at 1732, 82 USPQ2d at 1396. The Supreme Court also commented that the CAFC “no doubt has applied the test in accord with these principles [set forth in *KSR*] in many cases.” *Id.*

The CAFC has interpreted *KSR* to require an explicit showing that the prior art would have suggested making the specific modifications necessary to achieve the claimed invention. This standard was affirmed in *Ortho-McNeil Pharmaceutical, Inc. v. Mylan Laboratories, Inc.*, where the Federal Circuit continued application of the teaching, suggestion, and motivation test “flexibly applied” so as to require that any *prima facie* case of obviousness must be accompanied by an explicit showing where the relied on prior art provided the requisite teaching, suggestion, or motivation. 520 F.3d 1358, 1364-65 (Fed. Cir. 2008). The flexible nature of the test allows for a teaching, suggestion, or motivation to arise from knowledge in the art or from a standard desire to improve on prior inventions. However, if the cited prior art is limited to patents and publications as it is in the subject rejection, and does not draw on additional sources such as general knowledge in the art, the teaching, suggestion, or motivation to modify that prior art must be found therein and this teaching, suggestion, or motivation must be made explicit. The prior art of record fails to provide, explicitly or inherently, any teaching, suggestion, or

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motivation that would lead a person having ordinary skill in the art to the instantly claimed invention.

The standard set down in *KSR* is fully in line with historical precedent. As supported by the CAFC, there must be an express evidentiary showing of where the prior art provides motivation to combine all elements of the claims. It is a well established legal principle that to establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). Additionally, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify or combine reference teachings. *In re Rouffet*, 149 F.3d 1350, 1357, 47 USPQ2d 1453, 1457-58 (Fed. Cir. 1998). This suggestion or motivation must be made explicit. A *prima facie* case of obviousness may also be rebutted by showing that the art, in any material respect, teaches away from the claimed invention. *In re Geisler*, 116 F.3d 1465, 1471, 43 USPQ2d 1362, 1366 (Fed. Cir. 1997). Towler as a primary prior art reference fails each of these requirements.

In support of the above precedents, the Court in *KSR* suggested seven possible rationales for a finding of obviousness. These are captured in the Federal Register, 2007, Vol. 72, No. 195, 56525-56534, which serves as the current basis used by the USPTO for a finding of obviousness. These rationales are reproduced below.

- (A) Combining prior art elements according to known methods to yield predictable results;
- (B) Simple substitution of one known element for another to obtain predictable results;
- (C) Use of known technique to improve similar devices (methods, or products) in the same way;

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(D) Applying a known technique to a known device (method, or product) ready for improvement to yield predictable results;

(E) "Obvious to try"—choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success;

(F) Known work in one field of endeavor may prompt variations of it for use in either the same field or a different one based on design incentives or other market forces if the variations would have been predictable to one of ordinary skill in the art;

(G) Some teaching, suggestion, or motivation in the prior art that would have led one of ordinary skill to modify the prior art reference or to combine prior art reference teachings to arrive at the claimed invention.

(Federal Register, Vol. 72, No. 195, 57529).

Of the rationales to support a rejection under 35 U.S.C. §103, rationale G, namely that Examiner has found some teaching, suggestion, or motivation in Towler that would have led one of ordinary skill to modify Towler to arrive at the claimed invention, is assumed to be the basis underlying the outstanding rejection from the articulated grounds of rejection recited in Paper No. 20080716. The outstanding rejection fails to properly enumerate the rationale underlying the rejection, and as such, neither follows the Courts' requirements of an express basis of rejection, or the USPTO's current requirements for rejecting claims as obvious.

Independent of the shortcomings of the current rejection, a *prima facie* case of obviousness is not met under rationale G. The standards for an obviousness rejection under this rationale are reproduced below:

To reject a claim based on this rationale, Office personnel must resolve the Graham factual inquiries. Office personnel must then articulate the following:

(1) a finding that there was some teaching, suggestion, or motivation, either in the references themselves or in the knowledge

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generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings;

(2) a finding that there was reasonable expectation of success; and

(3) whatever additional findings based on the Graham factual inquiries may be necessary, in view of the facts of the case under consideration, to explain a conclusion of obviousness.

Applicant bases this assumption on the statement provided in the outstanding Office Action at page 4 where it states that:

Therefore, it would have been obvious to one of ordinary skill in the art at the time applicant's invention was made to provide the product stream of the water gas shift reaction is purified by passing the hydrogen through a hydrogen permeable membrane and leaving the raffinate (col. 4, lines 15-26; col. 7, lines 46-61) in Towler et al. in order to purify the product stream of the gas shift reaction as taught by Holland et al.

Thus, the rejection appears to find motivation from Towler et al. to take the product stream from the water gas shift reaction of Towler et al. and simply run the same into the hydrogen permeable membrane as taught by Holland et al. As detailed to a greater extent below, the prior art reference combination of Towler et al. and Holland et al. fails to afford the claimed invention since hydrogen permeation separation by way of a membrane fails to occur in the prior art reference combination within a secondary reactor as currently claimed.

**Substantive Distinctions Between Prior Art
Reference Combination and Claimed Invention**

Based on the teachings of Towler et al. and Holland et al. together or further in combination with knowledge of one of ordinary skill in the art at the time the subject invention was made are submitted to be insufficient for a finding of obviousness under the test enumerated in *Graham* as affirmed in *KSR*.

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The outstanding rejection is premised on the separation device 106 of Holland et al. as satisfying the last step of claim 16 as to selecting purified hydrogen by passing the hydrogen through a membrane. Applicant respectfully submits that this is factually incorrect as the relevant portion of claim 16 recites "collecting from said secondary stage water gas step membrane reactor a purified hydrogen flow passing through a membrane ..." (emphasis added). As Holland et al. fails to teach collection of purified hydrogen from the secondary fuel processing reactor and instead has to resort to a separate hydrogen separation device, the outstanding rejection fails to include teachings that when combined with Towler et al. yield all of the elements of pending independent claim 16. It is a well established legal principle that to establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974).

Additionally, with the reliance of the outstanding rejection on Holland et al. for membrane purification of hydrogen, it is noted that because the hydrogen separation device is separate from the secondary fuel processing reactor, that additional complexity results, as well as the inherent inefficiencies of material transit and temperature maintenance. These arguments are further bolstered by Holland et al. teaching the necessity of either a compressor or a comparable ejector needed to promote sufficient pressures to exact purification. Even one of less than ordinary skill in the art and indeed a layman would appreciate that a mechanical device such as a compressor or ejector in a system represents a potential source of mechanical failure with the likelihood of failure only compounded by the elevated temperatures under which hydrogen generation and purification occur. Accordingly, one can view the claimed invention as a surprising result over the prior art reference combination in that components 110, 112 and 106 according to Holland et al., Fig. 1 are replaced by a single secondary stage water gas step

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membrane reactor from which hydrogen purified flows, as shown in Fig. 2 of the pending application.

As such, it is respectfully submitted that the prior art reference combination fails to afford the claimed invention of independent claim 16 and reconsideration as to the patentability of this claim is requested. Applicant submits that pending dependent claims 17-25 which depend from claim 16 are likewise entitled to patentable weight on the basis of dependency from claim 16, now believed to be in allowable form. Additionally, Applicant submits that additional bases exist for the patentability of the subject matter of the dependent claims separate from dependency from independent claim 16. Applicant reserves the right to make arguments of record in the due course of prosecution with respect to the separate patentability as to the subject matter of dependent claims 17-25.

In light of the above amendments and remarks, reconsideration and withdrawal of the rejection as to claims 16-25 under 35 U.S.C. §103(a) over Towler in view of Holland et al. is requested.

Summary

Claims 16-25 are pending in the application of which only claim 16 is in independent form. Entry of this amendment and the reconsideration and withdrawal of the rejection as to these claims and the passing of this application to allowance are requested.

